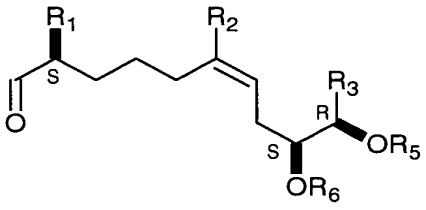
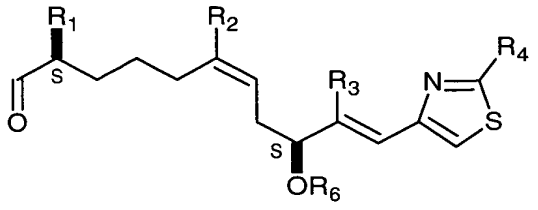
I claim:

1. A method for use in producing epothilones and analogs and derivatives thereof, comprising:

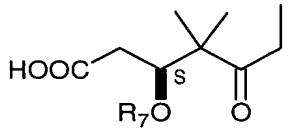
(a) performing an aldol condensation of a first compound selected from the formulas:

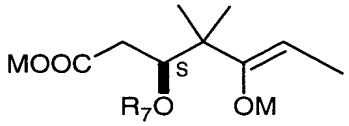




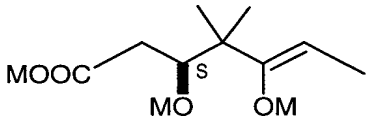
and

and stereoisomers thereof, with a second compound selected from the formulas:

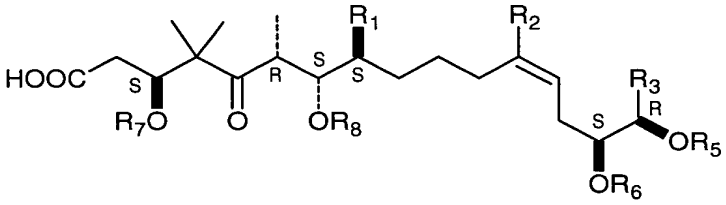




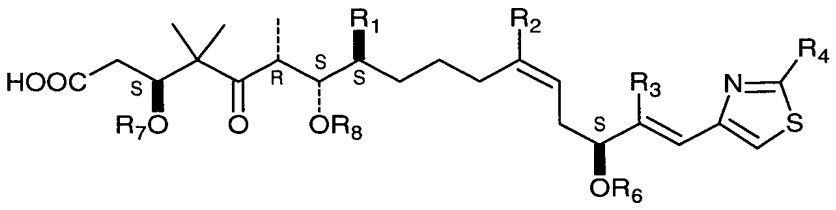
and



and stereoisomers thereof, thereby to form a third compound selected from the formulas:

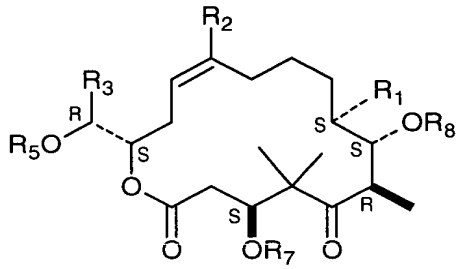


and

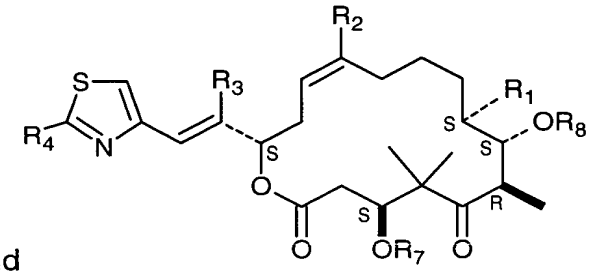


and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R_5, R_6, R_7 and R_8 are each selected from H and a protecting group; and wherein M is an alkali metal; and

(b) performing a macrolactonization of the third compound thereby to form a fourth compound selected from the formulas:



and



and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5, R_7 and R_8 are each selected from H and a protecting group.

2. A method according to claim 1 wherein R_1, R_3 and R_4 are each methyl, and R_2 is H or methyl.

3. A method according to claim 2 wherein R_2 is H.

4. A method according to claim 2 wherein R_2 is methyl.

5. A method according to claim 2 wherein at least one of R_5 - R_8 is TBS.

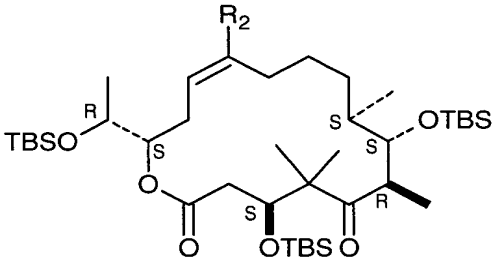
6. A method according to claim 2 wherein R_6, R_7 and R_8 are each TBS.

7. A method according to claim 2 wherein R_5 is PMB.

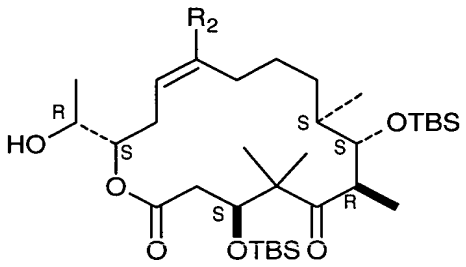
8. A method according to claim 2 wherein R_6 is SEM.

9. A method according to claim 1 wherein R_5 is selected from PMB, DPS and TBS; wherein R_6 is selected from H, TBS, TMS, TIPS, PMBM and SEM; wherein R_7 is selected from H, TBS, TROC, $-CO(CH_2)_4CH_3$ and $-CO(CH_2)_3CH=CH_2$; and wherein R_8 is selected from H and TBS.

10. A method according to claim 1 wherein said fourth compound is of a formula selected from:

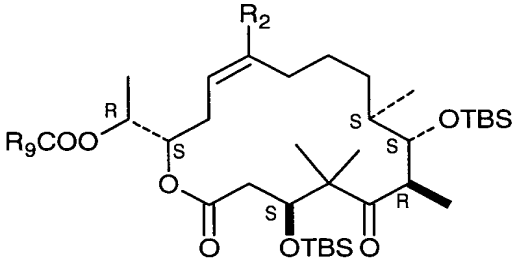


and stereoisomers thereof, where R_2 is H or methyl; and wherein said fourth compound is converted to a fifth compound of a formula selected from:



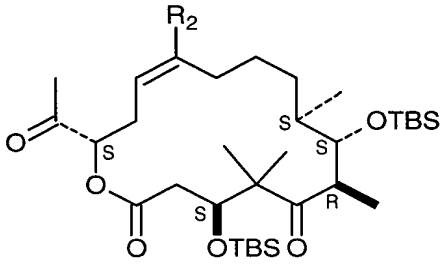
and stereoisomers thereof, where R_2 is H or methyl.

11. A method according to claim 10 wherein said fifth compound is converted to a sixth compound of a formula selected from:



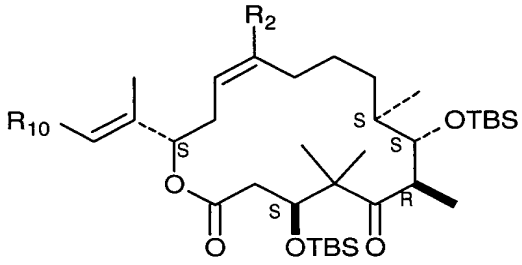
and stereoisomers thereof, where R_2 is H or methyl and wherein R_9 is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof.

12. A method according to claim 10 wherein said fifth compound is converted to a sixth compound of a formula selected from:



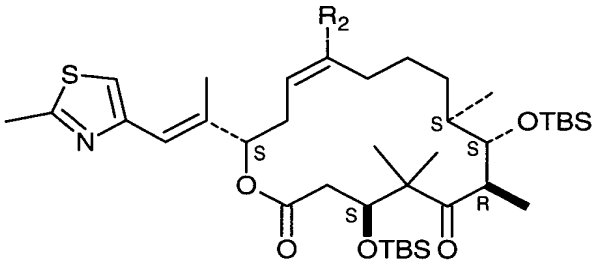
and stereoisomers thereof, where R_2 is H or methyl.

13. A method according to claim 12 wherein said fifth compound is converted to a sixth compound of a formula selected from:



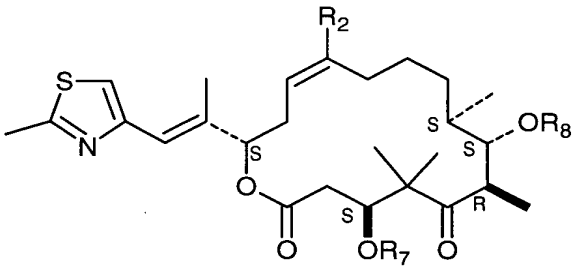
and stereoisomers thereof, where R_2 is H or methyl and wherein R_{10} is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof.

14. A method according to claim 13 wherein said sixth compound is of a formula selected from:



and stereoisomers thereof, where R_2 is H or methyl.

15. A method according to claim 1 wherein said fourth compound is of a formula selected from:

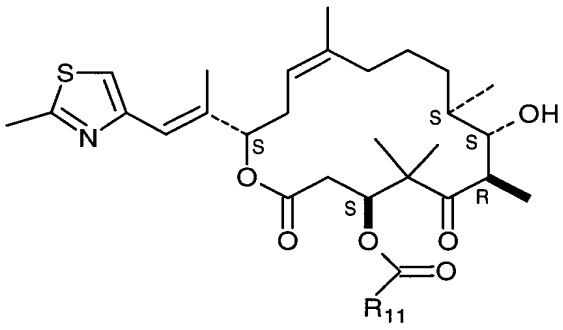


and stereoisomers thereof, where R_2 is H or methyl, R_7 is H or TBS, and R_8 is H, TBS, or TROC.

16. A method according to claim 15 wherein said fourth compound is further converted to Epothilone B.

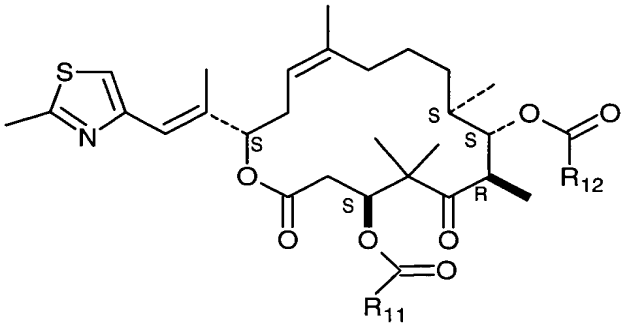
17. A method according to claim 15 wherein R_7 and R_8 each are H.

18. A method according to claim 17 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



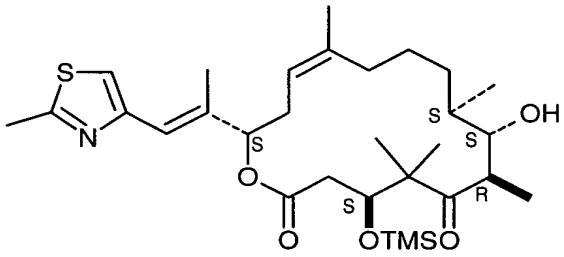
and stereoisomers thereof, wherein R_{11} is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

19. A method according to claim 18 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



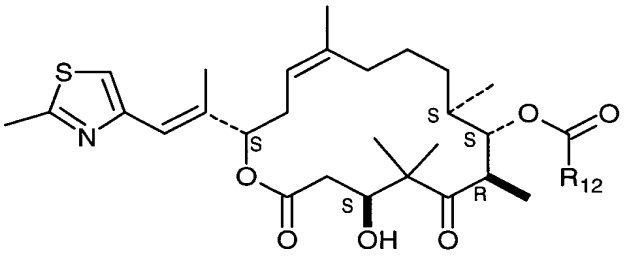
and stereoisomers thereof, wherein R_{11} and R_{12} are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

20. A method according to claim 17 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



and stereoisomers thereof.

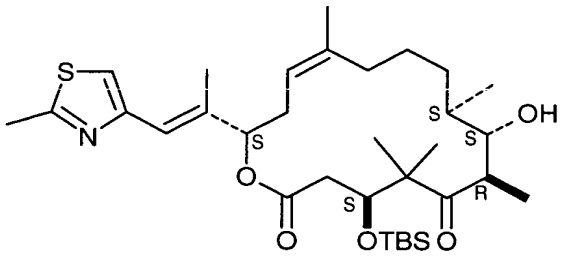
21. A method according to claim 20 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



and stereoisomers thereof, wherein R_{12} is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

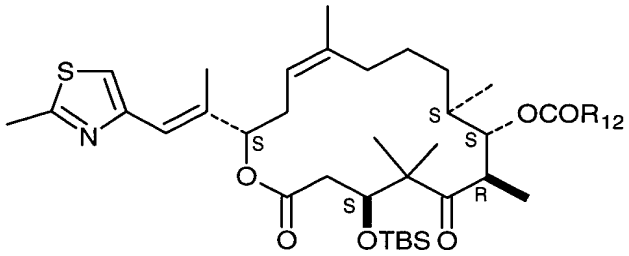
22. A method according to claim 15 wherein R_7 is TBS and R_8 is TROC.

23. A method according to claim 22 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



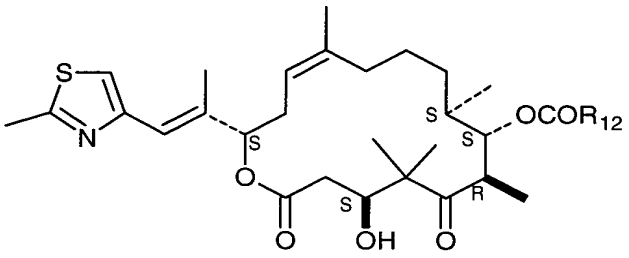
and stereoisomers thereof.

24. A method according to claim 23 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



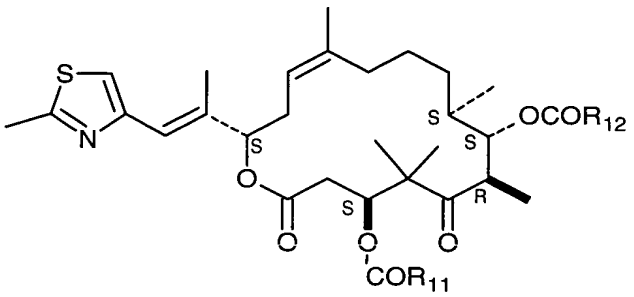
and stereoisomers thereof, wherein R_{12} is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

25. A method according to claim 24 wherein said sixth compound is further converted to a seventh compound of a formula selected from:



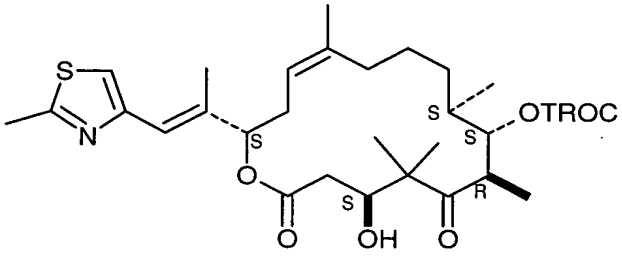
and stereoisomers thereof, wherein R_{12} is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

26. A method according to claim 25 wherein said seventh compound is further converted to an eighth compound of a formula selected from:



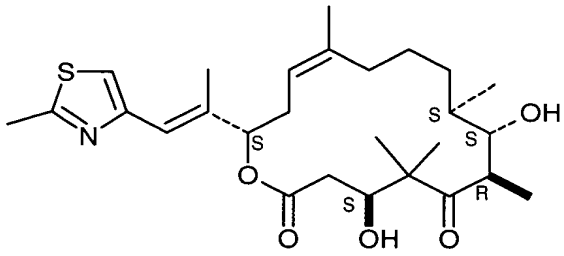
and stereoisomers thereof, wherein R_{11} and R_{12} are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

27. A method according to claim 22 wherein said fourth compound is further converted to a fifth compound of a formula selected from:



and stereoisomers thereof.

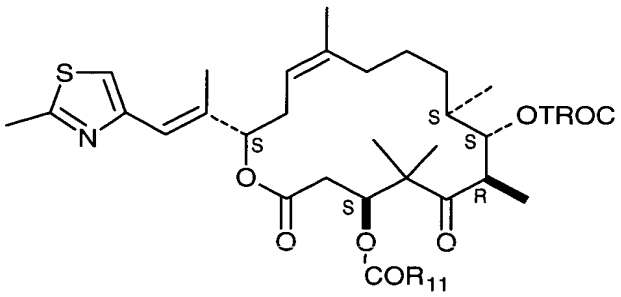
28. A method according to claim 27 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



and stereoisomers thereof.

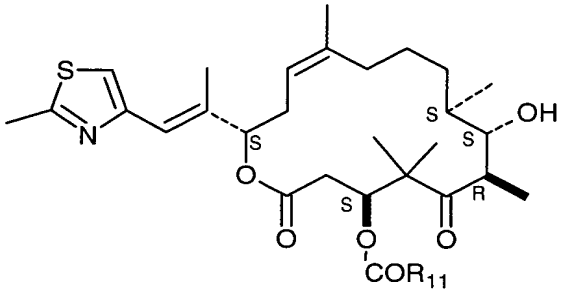
29. A method according to claim 28 wherein said sixth compound is further converted to Epothilone B.

30. A method according to claim 27 wherein said fifth compound is further converted to a sixth compound of a formula selected from:



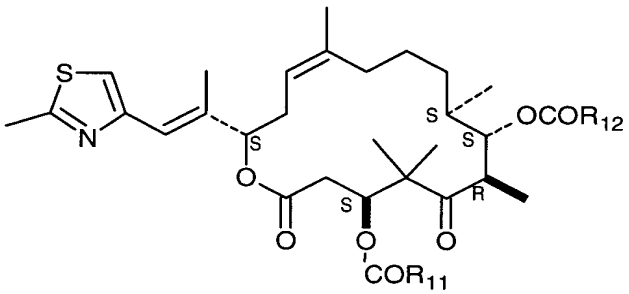
and stereoisomers thereof, wherein R_{11} is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

31. A method according to claim 30 wherein said sixth compound is further converted to a seventh compound of a formula selected from:



and stereoisomers thereof, wherein R_{11} is selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

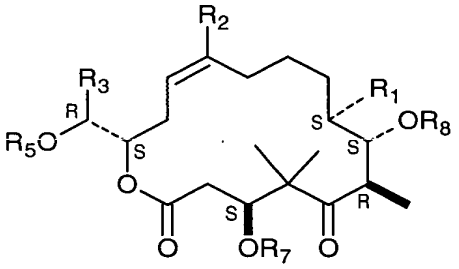
32. A method according to claim 31 wherein said seventh compound is further converted to an eighth compound of a formula selected from:

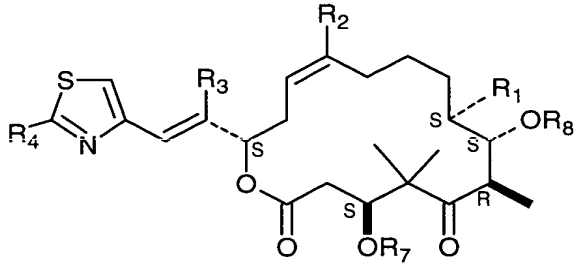


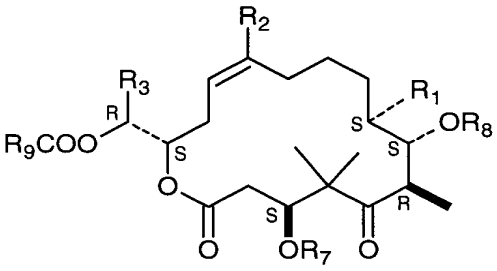
and stereoisomers thereof, wherein R_{11} and R_{12} are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

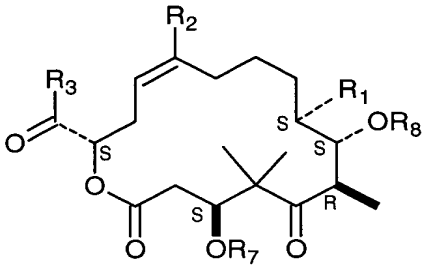
33. A chemical compound formed according to the method of claim 1.

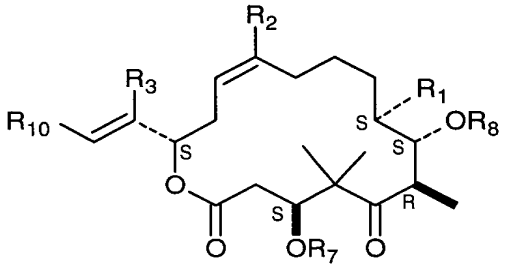
34. A chemical compound according to claim 33 wherein said compound is selected from the formulas:







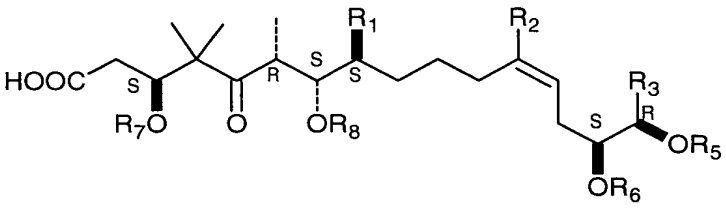




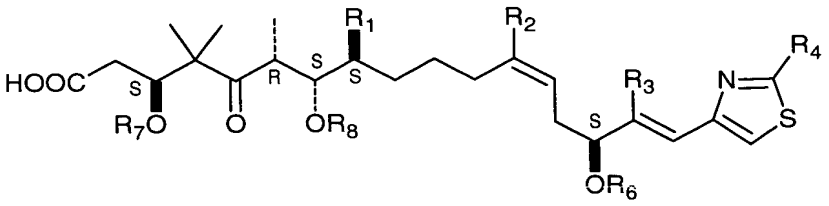
and

and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R_5 and R_6 are each selected from H and a protecting group; wherein R_7 is selected from H, a protecting group and COR_{11}; wherein R_8 is selected from H, a protecting group and COR_{12}; wherein R_9 is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R_{10} is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_{11} and R_{12} are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

35. A chemical compound having a formula selected from:



and



and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5, R_6, R_7 and R_8 are each selected from H and a protecting group.

36. A chemical compound according to claim 35 wherein R_1, R_3 and R_4 are each methyl, and R_2 is H or methyl.

37. A chemical compound according to claim 36 wherein R_2 is H.

38. A chemical compound according to claim 36 wherein R_2 is methyl.

39. A chemical compound according to claim 36 wherein at least one of R_5 - R_8 is TBS.

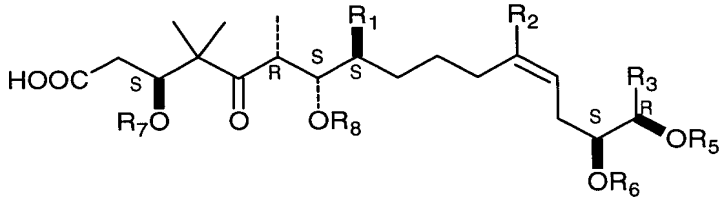
40. A chemical compound according to claim 36 wherein R_6, R_7 and R_8 are each TBS.

41. A chemical compound according to claim 36 wherein R_5 is PMB.

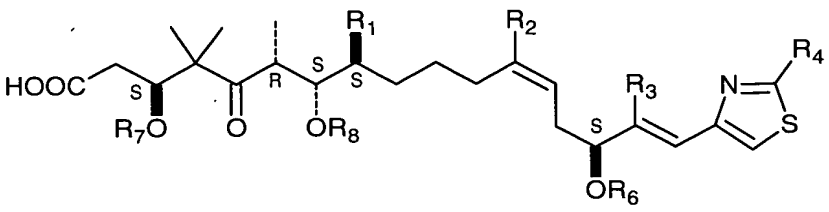
42. A chemical compound according to claim 36 wherein R_6 is SEM.

43. A chemical compound according to claim 35 wherein R_5 is selected from PMB, DPS and TBS; wherein R_6 is selected from H, TBS, TMS, TIPS, PMBM and SEM; wherein R_7 is selected from H, TBS, TROC, and $-CO(CH_2)_4CH_3$; and wherein R_8 is selected from H, TBS and TROC.

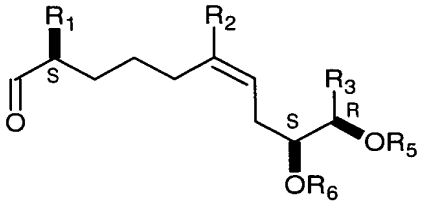
44. A method for producing a chemical compound having a formula selected from



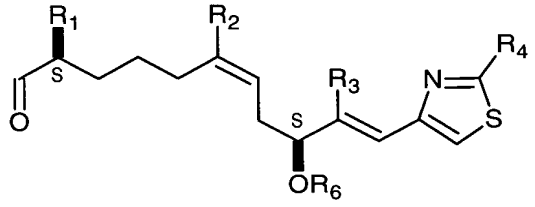
and



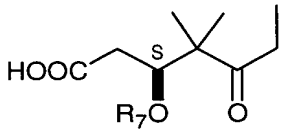
and stereoisomers thereof, which is useful in producing epothilones and analogs and derivatives thereof, comprising performing an aldol condensation of a first compound selected from the formulas:

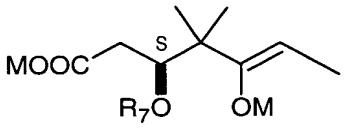


and

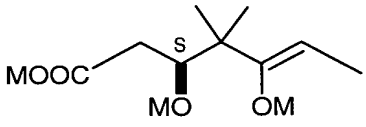


with a second compound selected from the formulas:





and



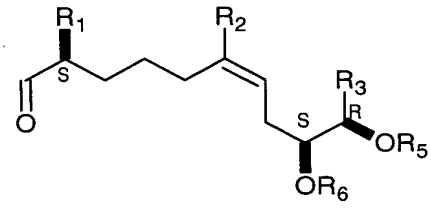
wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R_5, R_6, R_7 and R_8 are each selected from H and a protecting group; and wherein M is an alkali metal.

45. A method according to claim 44 wherein M is Li.

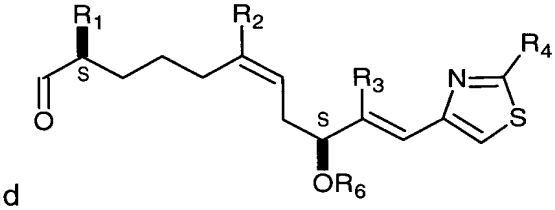
46. A method according to claim 44 wherein R_1, R_3 and R_4 are each methyl and wherein R_2 is H or methyl.

47. A method according to claim 44 wherein R_5 is selected from PMB, DPS and TBS; wherein R_6 is selected from H, TBS, TMS, TIPS, PMBM and SEM; wherein R_7 is selected from H, TBS, TROC, and $-CO(CH_2)_4CH_3$; and wherein R_8 is selected from H, TBS and TROC.

48. A chemical compound having a formula selected from:



and



and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5 and R_6 are each selected from H and a protecting group.

49. A chemical compound according to claim 48 wherein R_1, R_3 and R_4 are each methyl and wherein R_2 is H or methyl.

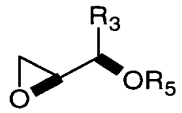
50. A chemical compound according to claim 48 wherein R_5 is selected from PMB, DPS and TBS; and wherein R_6 is selected from H, TBS, TMS, TIPS, PMBM and SEM.

51. A chemical compound according to claim 48 wherein R_1, R_3 and R_4 are each methyl; wherein R_2 is H or methyl; wherein R_5 is selected from PMB, DPS and TBS; and wherein R_6 is selected from H, TBS, TMS, TIPS, PMBM and SEM.

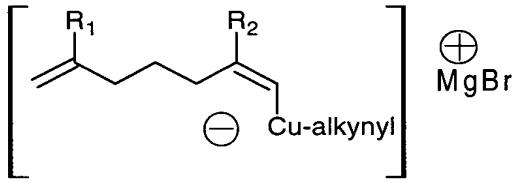
52. A chemical compound according to claim 51 wherein R_5 is selected from TBS and DPS and wherein R_6 is selected from TMS, TBS and PMB.

53. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

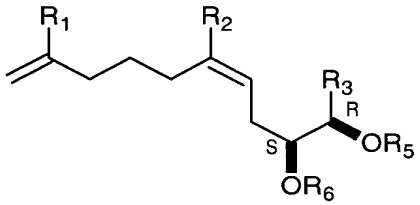
(a) reacting a first compound of a formula selected from:



and stereoisomers thereof, with a second compound of a formula:

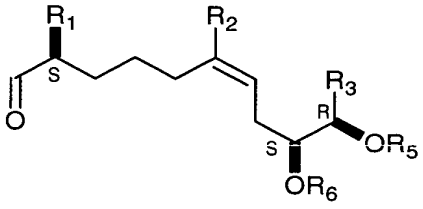


thereby to form a third compound of a formula selected from:

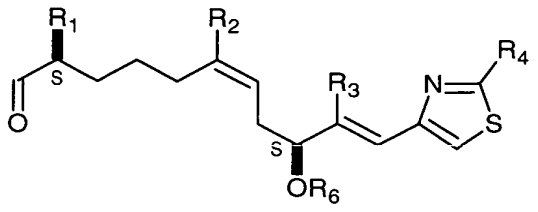


and stereoisomers thereof, wherein R_1, R_2, and R_3 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5 and R_6 are each selected from H and a protecting group; and

(b) converting said third compound into a fourth compound of a formula selected from:



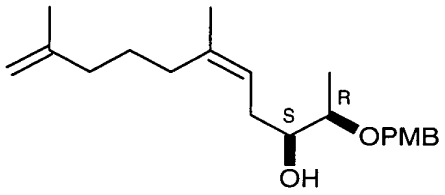
and

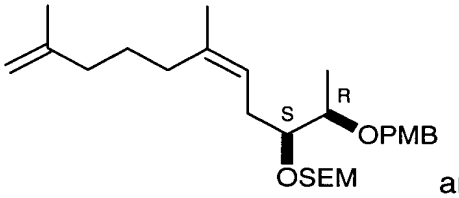


and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5 and R_6 are each selected from H and a protecting group.

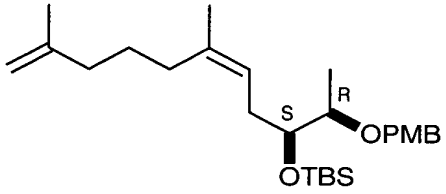
54. A method according to claim 53 wherein R_1, R_3 and R_4 are each methyl; wherein R_2 is H or methyl; wherein R_5 is selected from PMB, DPS and TBS; and wherein R_6 is selected from H, TBS, TMS, TIPS, PMBM and SEM.

55. A method according to claim 53 wherein said third compound is of a formula selected from:



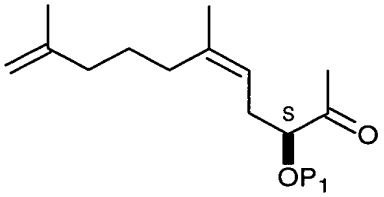


and

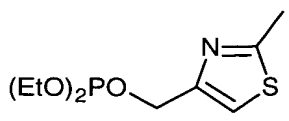


and stereoisomers thereof.

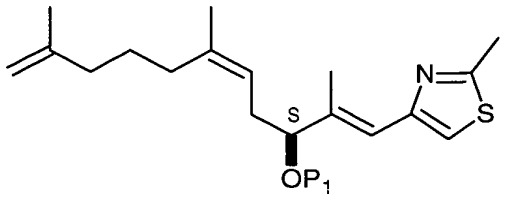
56. A method according to claim 55 wherein said third compound is further converted to a compound of formula:



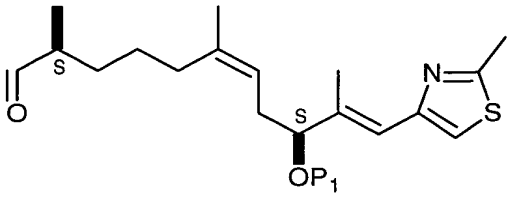
which is thereafter reacted with a compound of formula:



thereby to form a compound of formula:



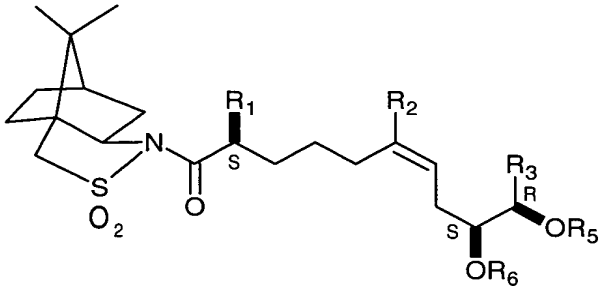
which is thereafter converted to said fourth compound of formula:



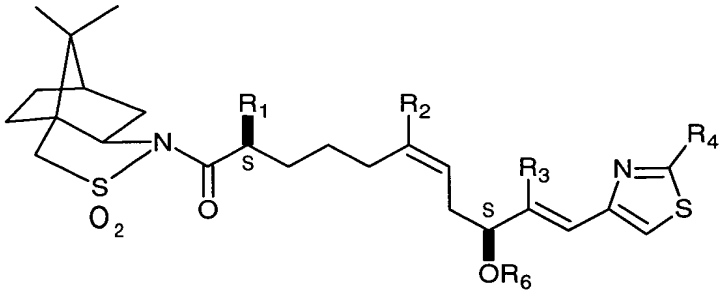
wherein P_1 is selected from TBS and SEM.

57. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

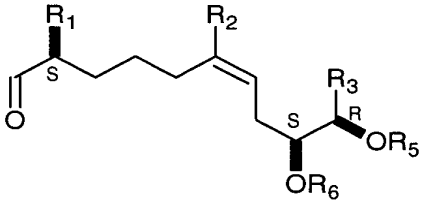
(a) converting a first compound of a formula selected from:



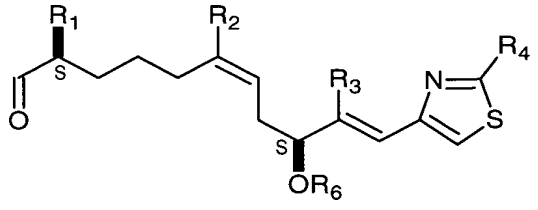
and



and stereoisomers thereof, to a second compound of a formula selected from

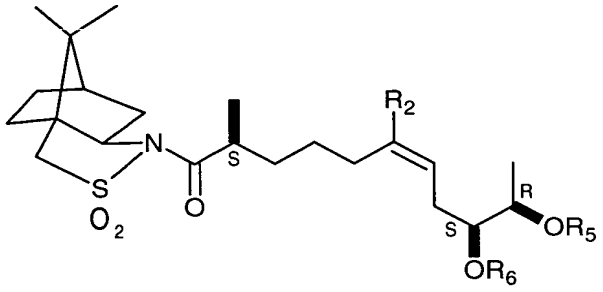


and



and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5 and R_6 are each selected from H and a protecting group.

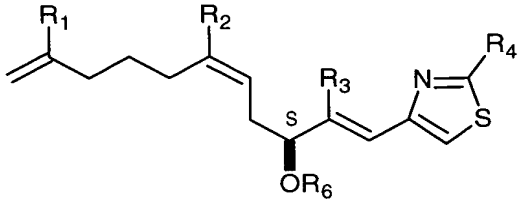
58. A method according to claim 57 wherein said first compound is of formula:



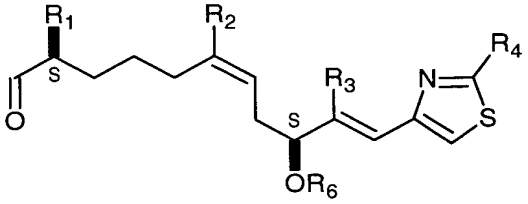
wherein R_2 is selected from H and methyl, R_5 is selected from TBS and DPS and wherein R_6 is selected from TMS and TBS.

59. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula:



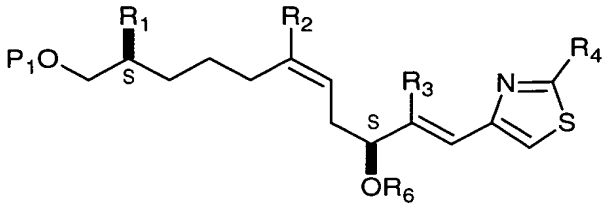
to a second compound of a formula selected from



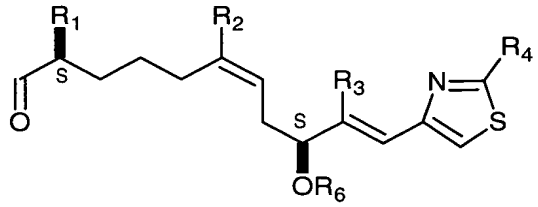
and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_6 is selected from H and a protecting group.

60. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula selected from:



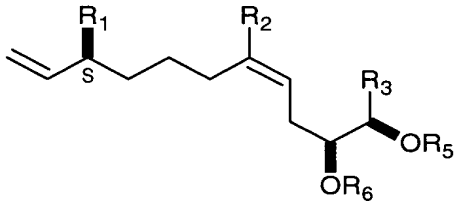
and stereoisomers thereof, to a second compound of a formula selected from



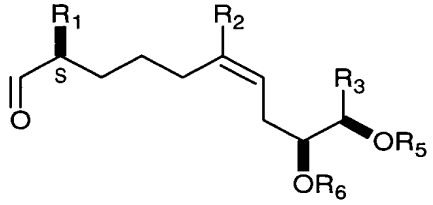
and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein P_1 and R_6 are each selected from H and a protecting group.

61. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula selected from:

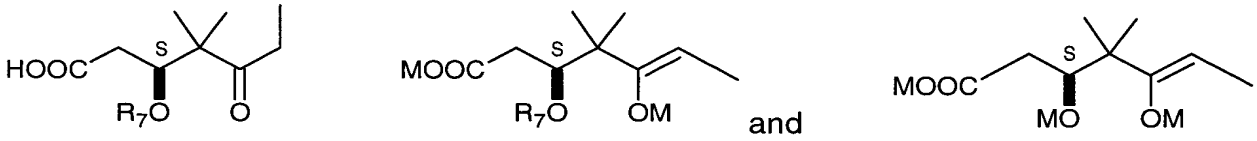


and stereoisomers thereof, to a second compound of a formula selected from



and stereoisomers thereof, wherein R_1, R_2, and R_3 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_5 and R_6 are each selected from H and a protecting group.

62. A chemical compound having a formula selected from:



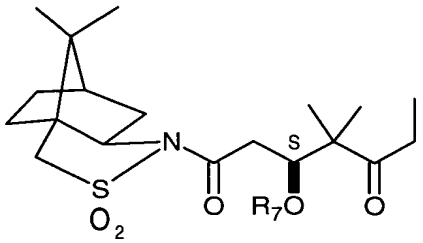
wherein M is an alkali metal and wherein R_7 is selected from H and a protecting group.

63. A chemical compound according to claim 62 wherein M is Li.

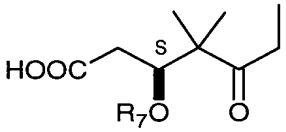
64. A chemical compound according to claim 62 wherein R_7 is selected from H and TBS.

65. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising

(a) converting a first compound of a formula:



to a second compound of a formula:

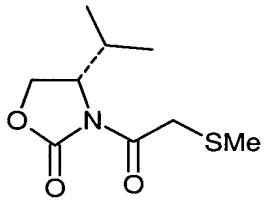


wherein R_7 is selected from H and a protecting group.

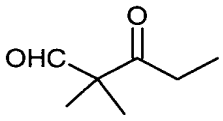
66. A method according to claim 65 wherein R_7 is TBS.

67. A process for producing a chemical compound useful in producing epothilones and analogs and derivatives thereof, comprising

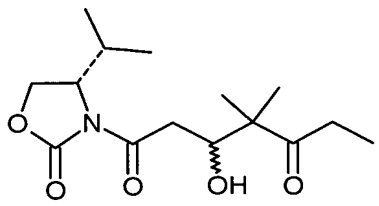
(a) reacting a first compound of a formula:



with a second compound of a formula:

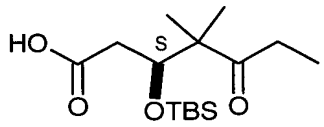


thereby to form a third compound of a formula:



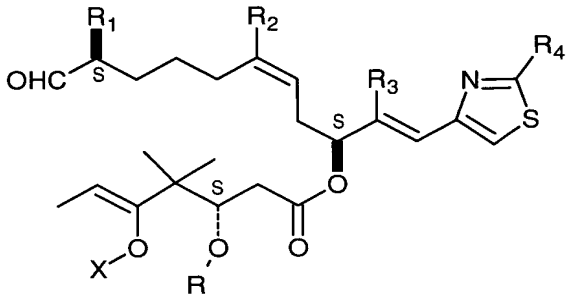
and

(b) converting said third compound to a fourth compound of a formula:

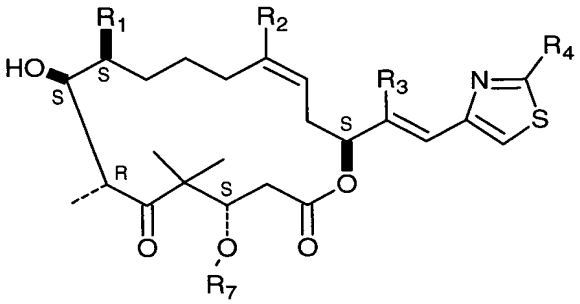


68. A process for use in producing epothilones and analogs and derivatives thereof, comprising:

(a) converting a first compound of a formula selected from:

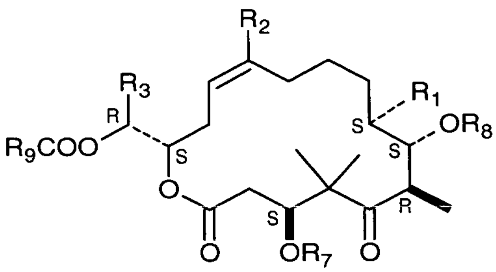


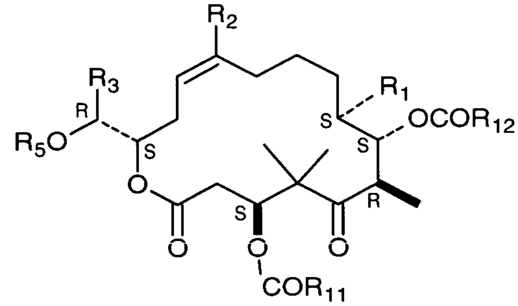
and stereoisomers thereof to a second compound of a formula selected from:

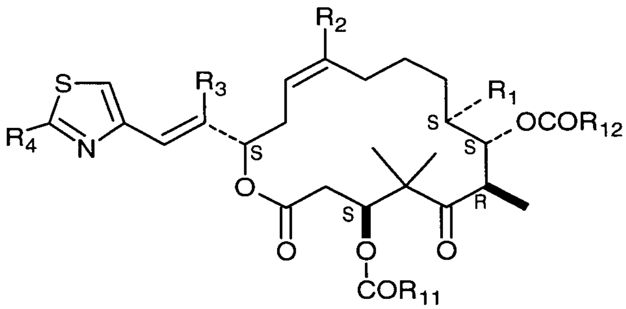


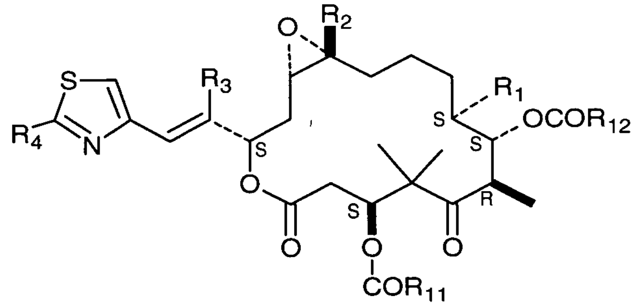
and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_7 is selected from H and a protecting group.

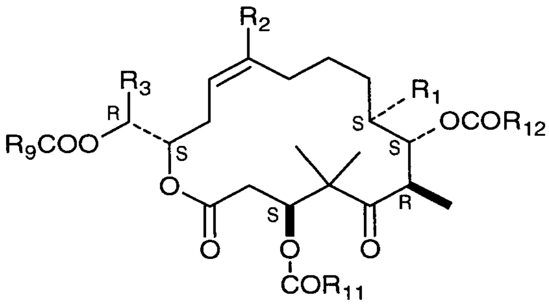
69. A chemical compound having a formula selected from:

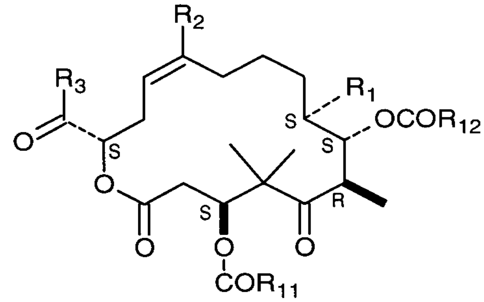

R2
R3
R1
R9COO
OR8
OR7

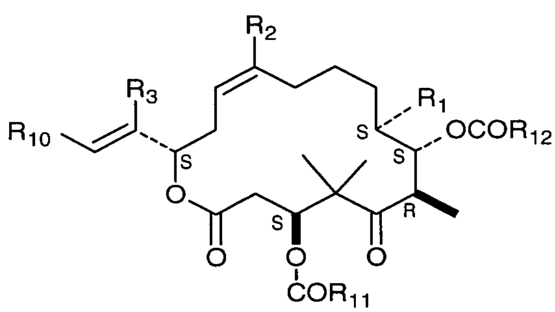

R2
R3
R1
R5O
OCOR12
COR11

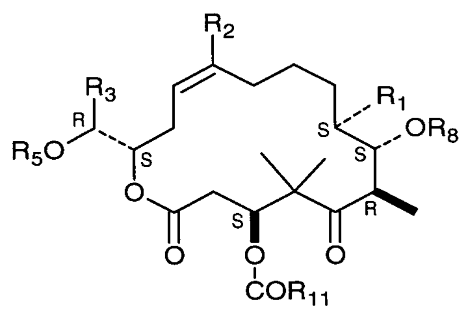

R2
R3
R1
R4
OCOR12
COR11

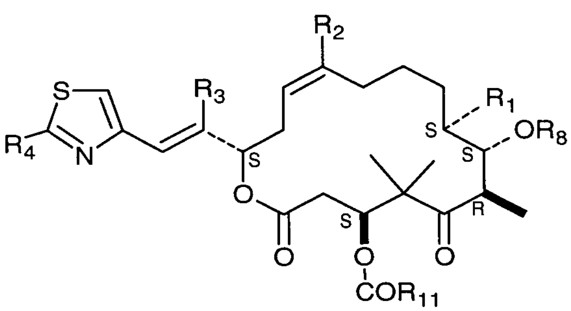

R2
R3
R1
R4
OCOR12
COR11

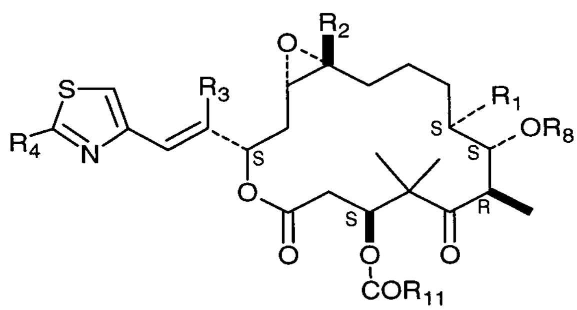

R2
R3
R1
R9COO
OCOR12
COR11

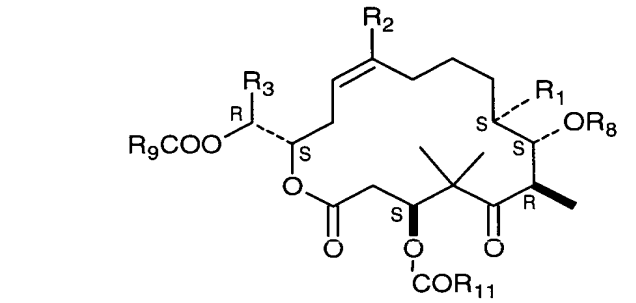

R2
R3
R1
OCOR12
COR11

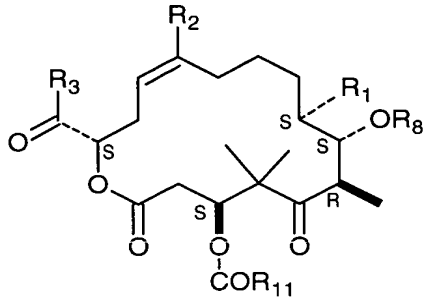

R2
R3
R1
R10
OCOR12
COR11

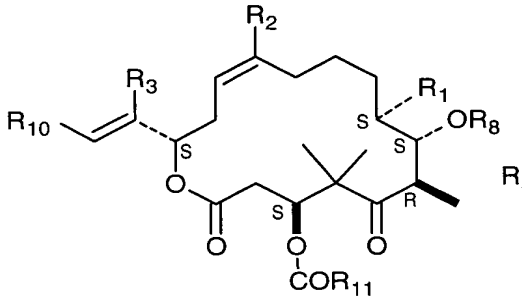

R2
R3
R1
R5O
OR8
COR11

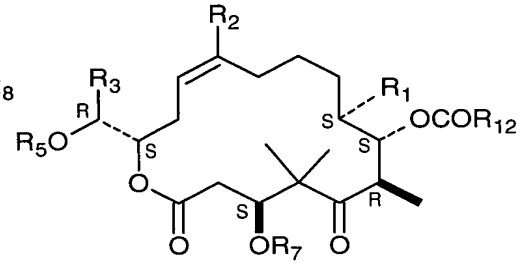

R2
R3
R1
R4
OR8
COR11

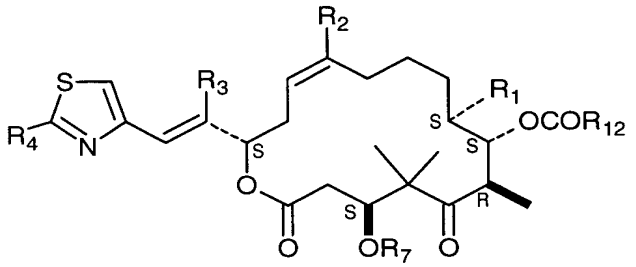

R2
R3
R1
R4
OR8
COR11

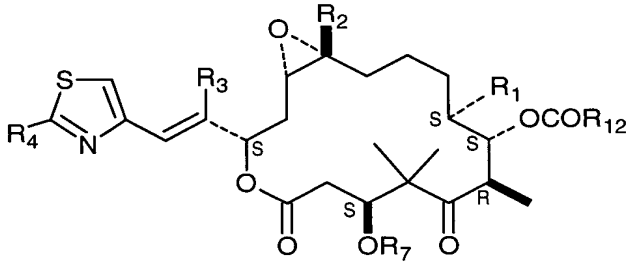


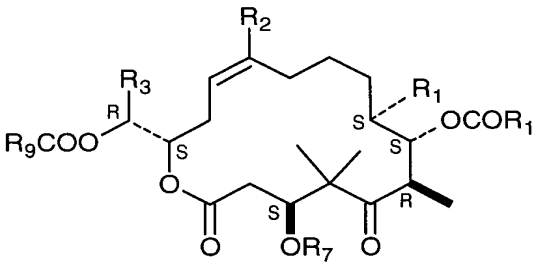


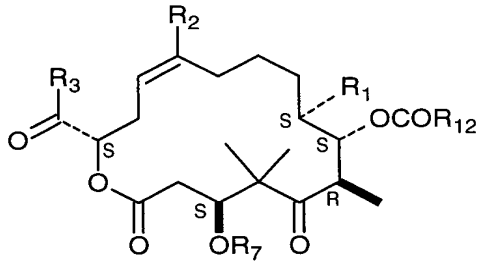


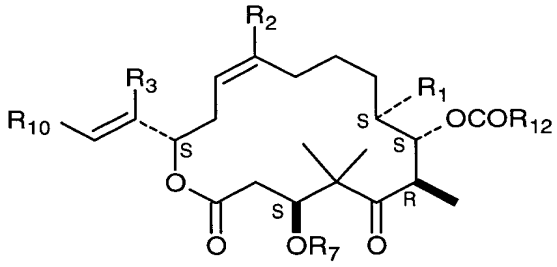












and

and stereoisomers thereof, wherein R_1, R_2, R_3 and R_4 are each selected from H, alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein R_5, R_6, R_7 and R_8 are each selected from H and a protecting group; wherein R_9 is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; wherein

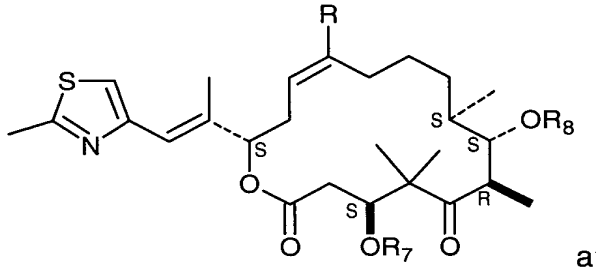
R_{10} is selected from alkyl, alkenyl, alkynyl, aryl, cycloalkyl, heterocyclo, and substitutions thereof; and wherein R_{11} and R_{12} are each selected from alkyl, alkenyl, alkynyl, aryl, alkyl-aryl, alkyloxy, aryloxy, cycloalkyl, heterocyclo, amino, sulfo, and substitutions thereof.

70. A chemical compound according to claim 69 wherein at least one of R_{11} and R_{12} is selected from $-(CH_2)_xCH_3$ and $-(CH_2)_yCH=CH_2$, where x and y are integers.

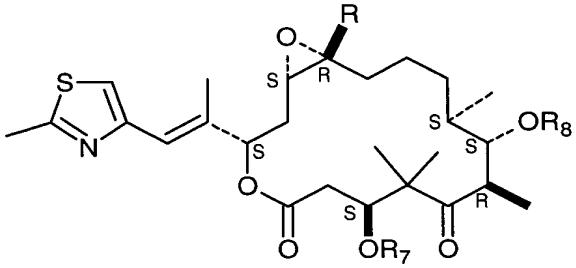
71. A chemical compound according to claim 69 wherein x and y are selected from the integers 3 and 4.

72. A chemical compound according to claim 70 wherein x is 4 and y is 3.

73. A chemical compound having a formula selected from:



and



and stereoisomers thereof, wherein R is H or methyl, R_7 is H or COR_{11}, R_8 is H or COR_{12}, and wherein R_{11} and R_{12} are each selected from $-(CH_2)_4CH_3$ and $-(CH_2)_3CH=CH_2$.